

Sub Spec #10
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SPECIFICATION AS AMENDED

METHOD AND APPARATUS FOR OPTICALLY DETECTING OBJECTS

Background of the Invention

The invention is based on an optical apparatus such as binoculars, camera and the like for the optical detection of objects such as geographical locations, persons, vehicles, and the like, whose identifying data are stored in satellite-aided transmission systems.

Summary of the Invention

This optical apparatus is intended to contain a component for optical fine focusing on such an object viewed via a target line. The target line is defined here as the axis between apparatus and object, which is defined with reference to the compass direction into which the apparatus is pointed and also by how far the apparatus is rotated above or below the horizontal. Furthermore, this apparatus contains a component to detect the distance between apparatus and the object, which may be done with optical or other means, where the display of the distance consists of data, such as electronic data, that can be processed further. The apparatus also contains a measurement unit to detect the angle of incline between global identification lines, such as magnetic identification lines, and the target line. The apparatus also contains a receiving unit to receive signals from satellites and a computer for data processing. The computer can process the distance data, data regarding the angle of incline, satellite signals as well as the data of the satellite-aided transmission systems or their storage. There is also an information display on the apparatus for the targeted display of data regarding the object, where the desired result of the computation is displayed automatically, for example as data from the satellite-aided transmission system, such as is well known in the case of locating, orienting and navigating of persons or vehicles with such satellite-aided transmission systems.

For a known optical apparatus of this type (DE-OS 43 12 310), the objects are detected by the computer using the data of a satellite navigation system and the compass heading and their identification is "verified cognitively". This is achieved by the intersection of two vectors, specifically first the heading vector of the compass and second the location vector of the satellite system. The disadvantage of this prior art apparatus consists of requiring a subsequent check of the information data and the object, because there is no reliable designation.

The computer of this invention also processes the distance value, which may vary with fine focus, and is programmed so that data regarding the currently selected object will appear on the information display after fine focusing. The advantage here is primarily the clean and reliable designation of information data for the object, such as a village, a specific person or a specific vehicle. Thus, the inventive apparatus can be used in many applications, such as in research or exploration projects, in emergencies and by the military, where errors may have particularly grave results.

In an advantageous embodiment of the invention, the computer works exclusively with electronic inputs.

In an additional advantageous embodiment of the invention, the display consists of a display unit with a LCD (liquid crystal display) with transparent electrodes on the display surface.

An additional advantageous embodiment of the invention uses a printer as the display to print out the results.

An additional advantageous embodiment of the invention uses an apparatus to process the data into acoustical signals and a loudspeaker as the display.

A preferred embodiment of the invention uses binoculars as the apparatus. The viewing area of the binoculars includes a display that displays the identity of the object immediately after focusing on the object.

An additional advantageous embodiment of the invention uses a navigation satellite system for the location determination of the optical apparatus. Such satellite systems are known, specifically to locate, for example, persons and vehicles for navigation within urban areas.

In an additional advantageous embodiment of the invention, the measurement unit cooperates with a compass to detect the azimuth angle between the target line and the North-South direction.

An additional advantageous embodiment of the invention uses a height-measuring device to detect the elevation angle between the target line and the horizontal and/or the vertical.

Brief Description of the Figures

Figure 1 is a flow chart of steps for detecting an object.

Figure 2 is a block diagram of the apparatus.

Figure 3 is a block diagram of the apparatus in use.

Detailed Description of the Invention

The invention uses an optical apparatus 10 such as binoculars, camera and the like for the optical detection of objects 100 such as geographical locations, persons, vehicles, and the like, whose identifying data are stored in satellite-aided transmission systems 110.

This optical apparatus 10 contains a component that allows for the optical fine focusing on an object 20, with reference to the compass direction into which the apparatus 10 is pointed. The apparatus contains a component that detects the distance 120 between apparatus and the object. This may be done by optical or other means. The distance data includes electronic data, that can be processed further. The apparatus contains a measurement unit 30 that detects the angle of incline between global identification lines, such as magnetic identification lines, and the target line. The apparatus contains a receiving unit 40 to receive signals from satellites and contains a computer 50 for data processing. The computer 50 processes the distance data described above, data regarding the angle of incline, satellite signals and the data from the satellite-aided transmission systems 110 or their storage. Information regarding the object is displayed. The data may be displayed automatically.

The computer 50 of this invention processes the distance value, which may vary with fine focus. Data regarding the currently selected object 100 will appear on the information display 60 after fine focusing.

In one embodiment, the computer 50 works exclusively with electronic inputs. In another embodiment of the invention, the display 60 consists of a display unit with a LCD (liquid crystal display) with transparent electrodes on the display surface. Another embodiment of the invention, uses a printer 90 as the display to print out the results. In yet another embodiment of the invention, the data is processed into acoustical signals and a loudspeaker 80 serves as the display. In another embodiment of the invention a navigation satellite system 110 is used for determining the location of the optical apparatus 10. In another embodiment of the invention, the measurement unit 30 cooperates with a compass (not shown) to detect the azimuth angle between the target line and the North-South direction. Another embodiment of

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the invention uses a height-measuring device 70 to detect the elevation angle between the target line and the horizontal and/or the vertical.

An object, such as a village, person, mountain, at a distance from an observer is viewed 130 by the observer using an optical apparatus. The observer adjusts the fine focus 150 of the apparatus and the apparatus detects the distance between the object and the apparatus 130. The apparatus receives target data 160 from a satellite and processed 170 the target data. Object data is computed 180 by the computer of the apparatus and the object data 190 is displayed.

Other advantages and advantageous embodiments of the invention may be derived from the claims.

All of the characteristics shown in the description and the following claims may be essential to the invention by themselves or in any possible combination with each other.